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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/562,814

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Nobuhisa Miyake

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STAAS & HALSEY LLP
SUITE 700
1201 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

EXAMINER

BOYKIN, TERRESSA M

ART UNIT

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1796

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/562,814	Applicant(s) MIYAKE ET AL.	
	Examiner Terressa M. Boykin	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 and 38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 and 38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Arguments

Applicant's arguments with respect to claims 1-34, 38 have been considered but are moot in view of the new ground(s) of rejection. Applicant's explanation of the Rejection under 102(e) has been noted and agreed. However, the publication date of the corresponding published PCT case (WO 03055840) appears to be valid under 102(a). That publication date is July 10, 2003.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-34,38 are rejected under 35 U.S.C. 102(a) as being anticipated by corresponding published PCT case (WO 03055840).

It is not readily apparent whether applicant's priority documents support the claims, and thus whether the patent family members actually antedate the filing dates of the priority documents. Clarification is required.

Claim Rejections 35 USC 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis

for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1- 34, 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5252771 see abstract, examples 1-9, claim 10.

US 5252771 discloses a process for the production of a diaryl carbonate useful in the preparation of polycarbonate molding resins comprising contacting an aromatic hydroxy compound and a carbonyl halide or aryl haloformate in the presence of a catalyst comprising aluminum trifluoride.

The process can be carried out at temperatures much higher than those achievable for homogeneous catalytic processes; high enough, in fact, that in one embodiment some or all reactants and some or all products remain in the gas phase when not in contact with or adsorbed on the catalyst or the catalyst support. These high temperatures have a beneficial effect on the kinetics of the chemical reaction. Suitable operating temperatures are from 25.degree. C. to 450.degree. C., preferably from 150.degree. C. to 400.degree. C., most preferably from 180.degree. C. to 300.degree. C.

The catalyst comprising aluminum trifluoride may be readily prepared by contacting an aluminum oxide such as alumina with hydrogen fluoride at elevated temperatures accompanied by evolution of water. Preferred temperatures for preparing such a catalyst are 250.degree. C. to 700.degree. C., more preferably 450.degree. C. to 600.degree. C. A preferred catalyst has a surface area from 0.1 to 1 m.²/g, more preferably 0.3 to 0.75 m.²/g. Additionally preferably the catalyst comprises from 50 to 100 percent alpha aluminum trifluoride, more preferably 95 to 100 percent alpha aluminum trifluoride, and most preferably 98 to 100 percent alpha aluminum trifluoride. Other components of the catalyst may include aluminum salts such as oxides, nitrides, halides, etc. and mixtures thereof.

Although the preferred catalysts of the invention are unsupported, the catalyst may also be incorporated onto a support if desired. For example a substrate material may be impregnated with an aluminum salt wherein the anion is an organic anion, such as a

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carboxylate or a dicarboxylate, for example, oxalate, or a nitrogen containing anion such as nitrate or nitrite. These salts may be converted to the corresponding aluminum oxide by calcining, for example by heating in air at temperatures above about 500.degree. C. Conversion of the alumina coating to AlF_3 may then be accomplished as previously disclosed.

Suitable support materials include refractory oxides, ceramics or other inert materials which are porous and stable at high temperatures. Examples include silica, aluminosilicates, carbon, silicon carbide, aluminum nitride, silicalite, titania, zirconia etc.

Preferred aromatic hydroxy compounds are phenols and bisphenols. Highly preferred aromatic hydroxy starting materials are phenol, bisphenol A (2,2-(4-hydroxyphenyl)propane) and bisphenol F (di(hydroxyphenyl)methane).

Preferred carbonyl halides are phosgene and bromophosgene. The aryl haloformates may be thought of as the intermediate product resulting from reaction of a carbonyl halide and an aromatic hydroxide. Thus, where present in the reaction mixture, they may be separated from the desired diaryl carbonate and recycled by contacting with the same or another aromatic hydroxide.

The process is carried out using phosgene as the carbonyl halide under conditions such that the phosgene is a gas. In a more preferable embodiment both the phosgene and aromatic hydroxide remain in the gas phase when not adsorbed on the catalyst or catalyst support. In one embodiment of the invention the product, diaryl carbonate, may also be a gas, however, preferably it remains a liquid. The temperature ranges that are preferred depend, therefore, upon the liquid to vapor transition temperature of the reactants and the products, the pressure at which the process is carried out, and, as an upper limit, the temperature at which degradation of the product occurs. In a preferred embodiment, where the starting materials are phenol and phosgene, and the product is diphenyl carbonate (DPC), the normal boiling point of phenol is 182.degree. C. and that of the product diphenyl carbonate is 302.degree. C., so the lower limit of the preferred temperature range for the process at 1 atm is 182.degree. C. and the upper limit is 302.degree. C.

Desirable inert gases for use in the process of this invention are nitrogen, carbon dioxide, and hydrocarbons, such as gaseous toluene. Pressures from about 0.01 atm to about 50 atm may be used, with pressures from about 0.1 atm to about 5 atm being preferred.

The mole ratio of the aromatic hydroxy compound to the carbonyl halide or aryl haloformate is 1:1 to 3:1. Higher ratios of carbonyl halide relative to the aromatic hydroxy compound result in larger amounts of aryl haloformate being formed. From a practical standpoint, it is preferable that the mole ratios be adjusted so that the carbonyl halide is completely consumed. In that way, recycle, removal, or further handling of the carbonyl halide is unnecessary. The aromatic hydroxy compound is more easily

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recycled. Preferred molar ratios of aromatic hydroxy compound to carbonyl halide are from 1.8:1 to 2.1:1.

The process can be carried out in any suitable reactor including a fixed bed reactor, a fluidized bed reactor or a circulating fluidized bed reactor, in which case the catalyst desirably is utilized as a fluidizable powder. Preferred reactors operate under continuous processing conditions. Desirable residence times in such reactors are from 1 to 3000 seconds. Preferred residence times are 1 to 60 seconds. Most preferred are residence times of 1 to 10 seconds. In addition, the rate at which the reactants are contacted with the catalyst in a continuous process is controlled to provide liquid hourly space velocities based on aromatic hydroxy compound preferably in the range from 0.01 to 10 hr.⁻¹, more preferably from 0.05 to 1 hr.⁻¹.

Periodic regeneration of the catalyst can improve the conversion rate of starting materials to product. Regeneration is accomplished by treating the catalyst with methanol or water at an elevated temperature in the range of about 400.degree. C. to about 600.degree. C.

The following examples are illustrative of the process of the present invention and are in no way intended to limit the scope of the present invention.

The catalyst was prepared by reacting gamma Al₂O₃ with HF at 500.degree. C. until the evolution of H₂O was complete. Analysis by X-ray diffraction showed the product to be greater than 98 mole percent AlF₃ in the alpha crystalline form. The surface area was 0.67 m²/gm. Elemental analysis confirmed the stoichiometric composition.

The polymer is formed in a tubular Hastelloy reactor containing the catalyst was heated to 200.degree. C. and a solution of toluene, phenol, and phenyl chloroformate was introduced. The products were collected in a cooled receiver and analyzed by gas chromatography. The results and experimental conditions are given in Table 1.

EXAMPLES 1-9 TABLE 1 and TABLE 2

The reference **USP 5252771** discloses a dialkyl carbonate prepared from the same components as claimed by applicants except for the type of separation of the water or liquid and the amounts and parameters, i.e. particular stoichiometric amount relative to the amount of the carbon dioxide, as claimed. It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ not only

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employ the various separation techniques as claimed but also the particular amounts and/or parameters as known in the art, since it is well-established that merely selecting proportions and ranges is not patentable absent a showing of criticality. In re Becket, 33 U.S.P.Q. 33 (C.C.P.A. 1937). In re Russell, 439 F.2d 1228, 169 U.S.P.Q. 426 (C.C.P.A. 1971). One would have been motivated to use any of the various techniques as claimed by applicants in claims 14-19 since the reference itself discloses above that the process can be carried out *in any suitable reactor* including a fixed bed reactor, a fluidized bed reactor or a circulating fluidized bed reactor, in which case the catalyst desirably is utilized as a fluidizable powder. Preferred reactors operate under continuous processing conditions. In addition, the rate at which the reactants are contacted with the catalyst in a continuous process is controlled to provide liquid hourly space velocities based on aromatic hydroxy compound.

Consequently, the claimed process is unobvious and accordingly not patentable.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Terressa M. Boykin whose telephone number is 571 272-1069. The examiner can normally be reached on Monday-Thursday 10-5:30 Friday (work at home).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on 571 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Terressa M. Boykin/

Primary Examiner, Art Unit 1796